D/A Converter Series for Electronic Adjustments

Standard 8bit 2ch・3ch Type D/A Converters

BH2219FVM, BH2220FVM

No.09052EAT01

●Description

The BH2219FVM and BH2220FVM are 8bit R-2R-type D/A converters with 2 and 3 channels, respectively. A compact package allows adjacent placement, thereby eliminating deterioration of the D/A converter due to wire pattern. Furthermore, a built-in RESET function ensures that the output voltage at all channels is Low during power up. A broad power supply voltage range (2.7V-5.5V) is available, providing design flexibility.

●Features

1) Compact package enabling adjacent placement
2) Built-in RESET function
3) High speed output response characteristics
4) 3-line serial interface
5) Broad power supply voltage range: 2.7V-5.5V

●Applications

DVCs, DSCs, DVDs, CD-Rs, CD-RWs

●Lineup

Parameter	BH2219FVM	BH2220FVM
Power source voltage range	2.7V to 5.5V	2.7V to 5.5V
Number of channels	2ch	3ch
Current consumption	0.6mA	0.6mA
Differential non linearity error	±1.0LSB	±1.0LSB
Integral non linearity error	±1.5LSB	±1.5LSB
Output current performance	±1.0mA	±1.0mA
Settling time	100μs	100μs
Maximum data transfer frequency	10MHz	10MHz
Input method	CMOS	CMOS
Data latch method	LD method	LD method
Package	MSOP8	MSOP8

●Absolute Maximum Ratings(Ta=25℃)

Parameter	Symbol	Limits	Unit	Remarks
Power source voltage	VCC	-0.3 to 7.0	V	-
Terminal voltage	VIN	-0.3 to VCC	V	-
Storage temperature range	TSTG	-55 to 125	℃	-
Power dissipation	PD	470*1	mW	-

*1 Derated at 4.7mW/C at Ta>25℃
*2 These products are not robust against radiation

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●Recommended Operating Conditions(Ta=25℃)

Parameter	Symbol	Limits			Unit	Remarks
		MIN.	TYP.	MAX.		
VCC power source voltage	VCC	2.7	-	5.5	V	-
Terminal input voltage range	VIN	0	-	VCC	V	-
Analog output current	IO	-1.0	-	1.0	mA	-
Action temperature range	TOPR	-30	-	85	℃	-
Serial clock frequency	FSCLK	-	1.0	10.0	MHz	-
Limit load capacity	CL	-	-	0.1	μF	-

●Electrical Characteristics(Unless otherwise specified, VCC=3.0V, RL=OPEN, CL=0pF, Ta=25℃)

Parameter	Symbol	Limits			Unit	Conditions
		MIN.	TYP.	MAX.		
<Current consumption>						
VCC system	ICC	-	0.4	0.8	mA	CLK=1MHz, 80H setting
<Logic interface>						
L input voltage	VIL	GND	-	0.2VCC	V	-
H input voltage	VIH	0.8VCC	-	VCC	V	-
Input current	IIN	-10	-	10	μA	-
<Buffer amplifier>						
Output zero scale voltage	ZS1	GND	-	0.1	V	00H setting, at no load
	ZS2	GND	-	0.3	V	00H setting, IOH=1.0mA
Output full scale voltage	FS1	VCC-0.1	-	VCC	V	FFH setting, at no load
	FS2	VCC-0.3	-	VCC	V	FFH setting, IOL=1.0mA
<D/A converter precision>						
Differential non linearity error	DNL	-1.0	-	1.0	LSB	Input code 02H to FDH
Integral non linearity error	INL	-1.5	-	1.5	LSB	Input code 02H to FDH
VCC power source voltage rise time	trVCC	100	-	-	μs	VCC=0→2.7V
Power ON reset release voltage	VPOR	-	1.9	-	V	-

●Timing Chart(Unless otherwise specified, VCC = 3.0V, Ta = 25℃)

Parameter	Symbol	Limits			Unit	Conditions
		MIN.	TYP.	MAX.		
CLK L level time	tCLKL	50	-	-	ns	-
CLK H level time	tCLKH	50	-	-	ns	-
DI setup time	tsDI	20	-	-	ns	-
DI hold time	thDI	40	-	-	ns	-
LD setup time	tsLD	50	-	-	ns	-
LD hold time	thLD	50	-	-	ns	-
LD H level time	tLDH	50	-	-	ns	-
Output settling time	tOUT	-	-	100	μs	CL=50pF, RL=10kΩ

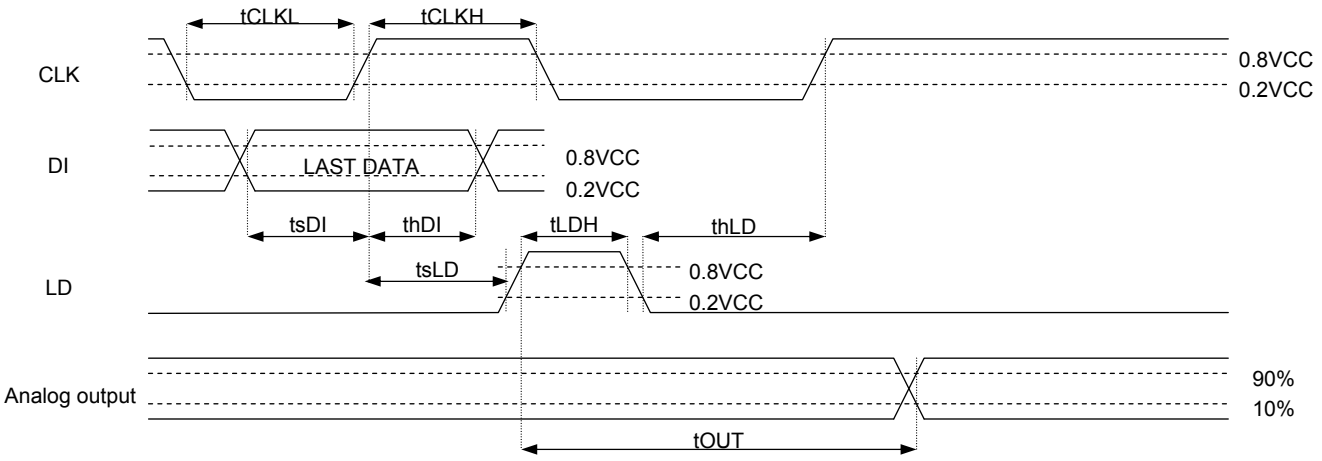


Fig.1

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●Terminal Description / Block Diagrams

(BH2219FVM)

Terminal	Terminal name	Function
1	AO1	Analog output terminal
2	AO2	
3	TEST MONI	Test terminal (OPEN at normal use)
4	VCC	Power source terminal
5	GND	Ground terminal
6	DI	Serial data input terminal
7	CLK	Serial clock input terminal
8	LD	Serial data load input terminal

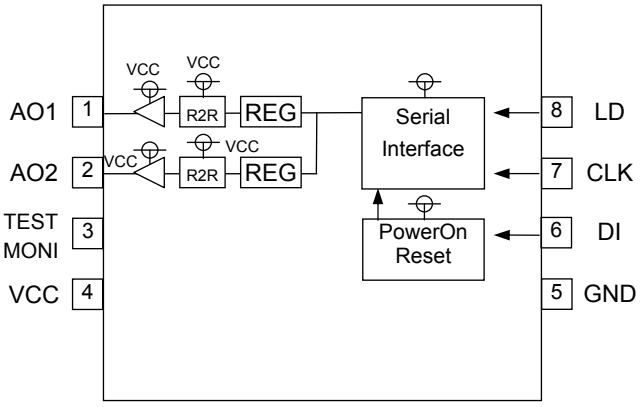


Fig.2

(BH2220FVM)

Terminal	Terminal name	Function
1	AO1	Analog output terminal
2	AO2	
3	AO3	
4	VCC	Power source terminal
5	GND	Ground terminal
6	DI	Serial data input terminal
7	CLK	Serial clock input terminal
8	LD	Serial data load input terminal

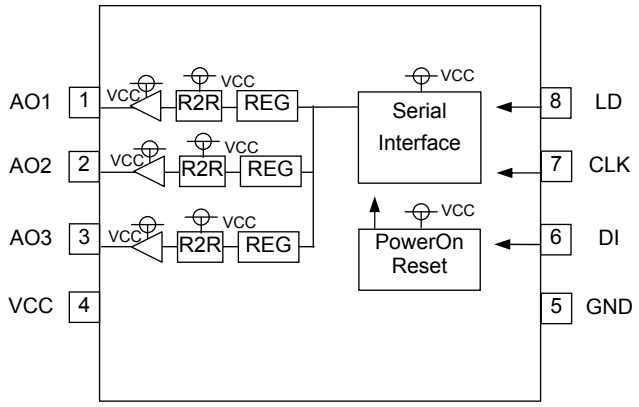


Fig.3

●Equivalent Circuits

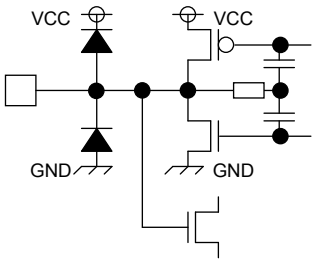
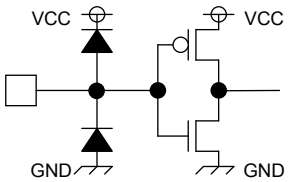
Terminal	Equivalent circuit	Terminal	Equivalent circuit
AO1 AO2 AO3		DI CLK LD	

Fig.4 Equivalent circuit

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●Operation Description

Serial Interface

The Control command consists of 3 lines of 12bit serial input data (MSB first).
DI data is read at the rising edge of the CLK, and is held in the LD Low area.
The output data is determined in LD High area.

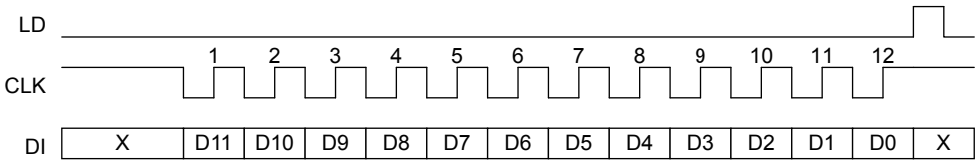


Fig.5

Data Settings

D0	D1	D2	D3	D4	D5	D6	D7	Setting
0	0	0	0	0	0	0	0	GND
1	0	0	0	0	0	0	0	(VCC-GND)/256x1
0	1	0	0	0	0	0	0	(VCC-GND)/256x2
1	1	0	0	0	0	0	0	(VCC-GND)/256x3
0	0	1	0	0	0	0	0	(VCC-GND)/256x4
~								~
0	1	1	1	1	1	1	1	(VCC-GND)/256x254
1	1	1	1	1	1	1	1	(VCC-GND)/256x255

Channel Setting (BH2219FVM)

D8	D9	D10	D11	Setting
0	0	X	X	AO1
1	0	X	X	AO2
0	1	X	X	Inconsequential
1	1	X	X	Inconsequential

Channel setting (BH2220FVM)

D8	D9	D10	D11	Setting
0	0	X	X	AO1
1	0	X	X	AO2
0	1	X	X	AO3
1	1	X	X	Inconsequential

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●Electrical Characteristics Curves

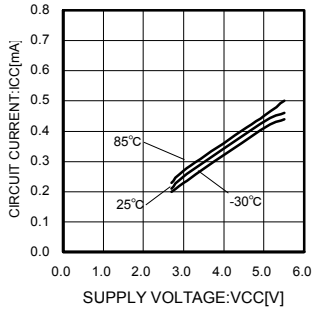


Fig.6 Action current consumption

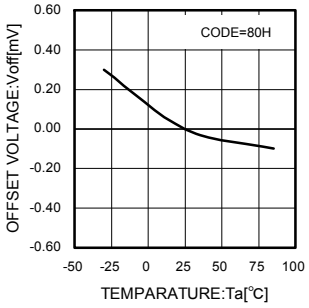


Fig.7 DC offset voltage

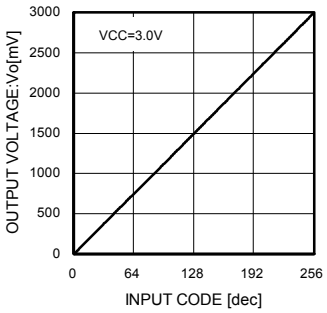


Fig.8 Output voltage characteristic

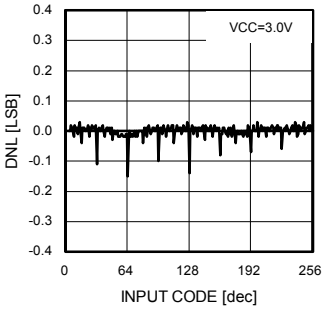


Fig.9 Differential non linearity error

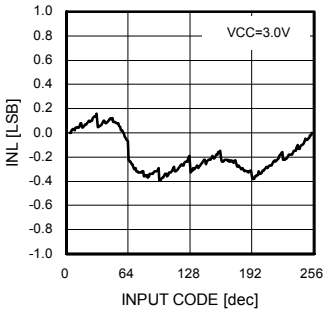


Fig.10 Integral non linearity error

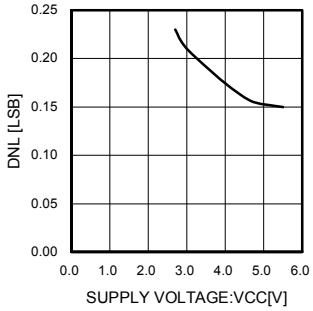


Fig.11 Power source voltage to differential non linearity

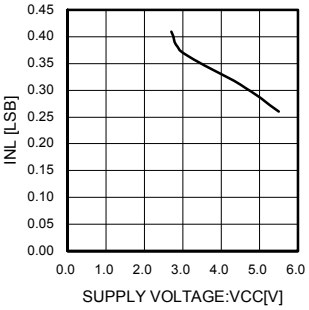


Fig.12 Power source voltage to integral non linearity error

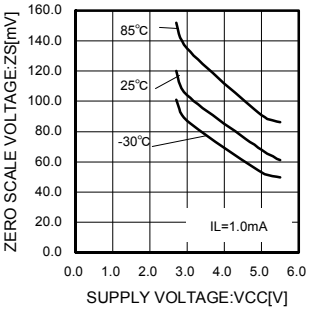


Fig.13 Output zero scale voltage

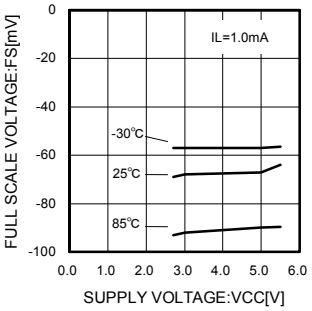


Fig.14 Output full scale voltage

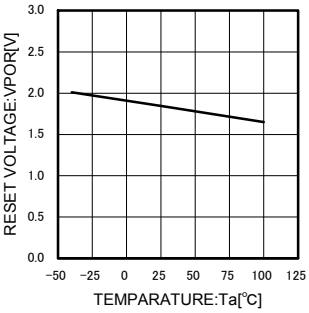


Fig.15 Reset release voltage

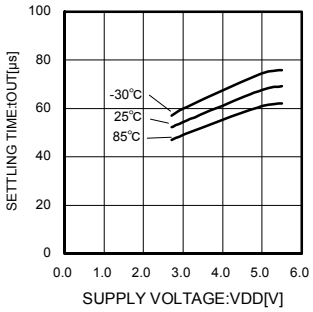


Fig.16 Settling time

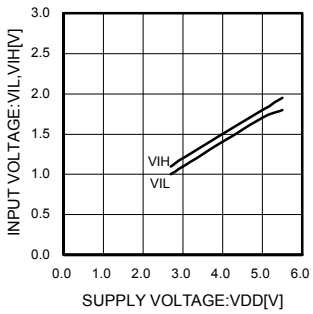


Fig.17 Input voltage

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●Notes for use

(1) Numbers and data in entries are representative design values and are not guaranteed values of the items.

(2) Although we are confident in recommending the sample application circuits, carefully check their characteristics further when using them. When modifying externally attached component constants before use, determine them so that they have sufficient margins by taking into account variations in externally attached components and the Rohm LSI, not only for static characteristics but also including transient characteristics.

(3) Absolute maximum ratings
Operating or testing the device over the maximum specifications may damage the part itself as well as peripheral components. Therefore, please ensure that the specifications are not exceeded.

(4) GND potential
Ensure that the GND terminal is at the lowest potential under all operating conditions.

(5) Thermal design
Use a thermal design that allows for a sufficient margin regarding power dissipation (Pd) under actual operating conditions.

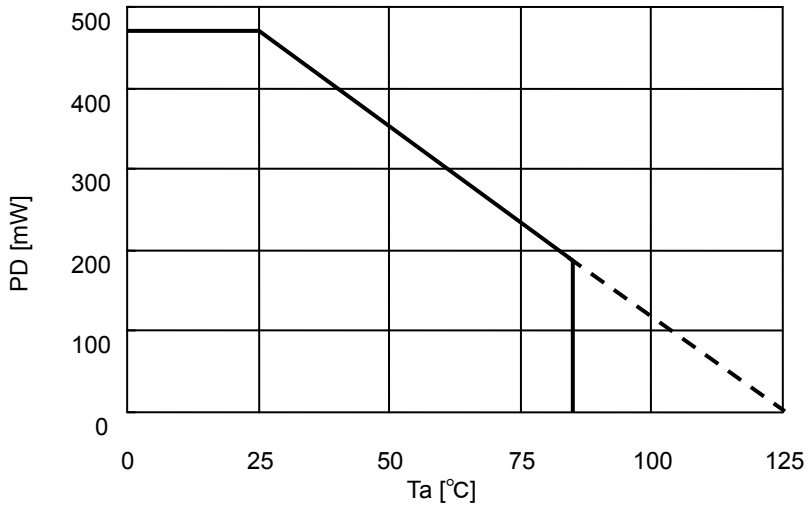
(6) Terminal shorts and mis-mounting
Incorrect orientation or misalignment of the IC when mounting to the PCB may damage part. Short-circuits caused by the introduction of foreign matter between the output terminals or across the output and power supply or GND may also result in destruction.

(7) Operation in a strong magnetic field
Operation in a strong electromagnetic field may cause malfunction.

(8) Reset circuit
The power on reset circuit, which initializes internal settings, may malfunction during abrupt power ons. Therefore, set the time constant so as to satisfy the power source rise time.

●Thermal Derating Curve

・MSOP8



Board size: 70 x 70 x 1.6mm Material : FR4 glass epoxy board (copper foil area less than 3%)

Fig.18

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●Ordering part number

B	H	2	2	1	9	F	V	M	-	T	R

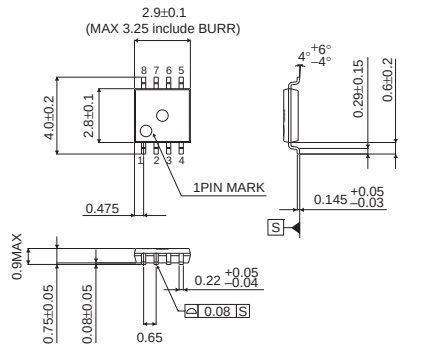
Part No.

Part No.
2219
2220

Package
FVM: MSOP8

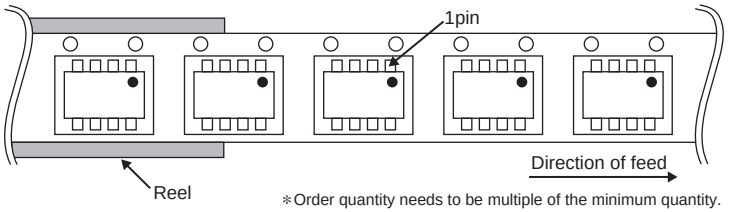
Packaging and forming specification
TR: Embossed tape and reel

MSOP8



<Tape and Reel information>

Tape	Embossed carrier tape
Quantity	3000pcs
Direction of feed	TR (The direction is the 1pin of product is at the upper right when you hold reel on the left hand and you pull out the tape on the right hand)



∗Order quantity needs to be multiple of the minimum quantity.

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